

# Safety Data Sheet

# Dibenz[a,h]- anthracene

Division of Safety  
National Institutes  
of Health



## WARNING!

THIS COMPOUND IS ABSORBED THROUGH THE SKIN AND RESPIRATORY AND INTESTINAL TRACTS. IT IS CARCINOGENIC AND MAY IRRITATE TISSUES AND INDUCE SENSITIVITY. AVOID FORMATION AND BREATHING OF DUSTS.

LABORATORY OPERATIONS SHOULD BE CONDUCTED IN A FUME HOOD, GLOVE BOX, OR VENTILATED CABINET.

AVOID SKIN CONTACT: IF EXPOSED, WASH WITH SOAP AND WATER. AVOID WASHING WITH SOLVENTS AND EXPOSURE TO UV LIGHT.

FOR EYE EXPOSURE, IRRIGATE IMMEDIATELY WITH LARGE AMOUNTS OF WATER. FOR INGESTION, INDUCE VOMITING. FOR INHALATION, REMOVE VICTIM PROMPTLY TO CLEAN AIR. ADMINISTER RESCUE BREATHING IF NECESSARY. REFER TO PHYSICIAN.

IN CASE OF LABORATORY SPILL, WEAR PROTECTIVE CLOTHING DURING CLEANUP. AVOID SKIN CONTACT OR BREATHING OF DUST. USE ORGANIC SOLVENT (NOT ALCOHOL) TO DISSOLVE COMPOUND. WASH DOWN AREA WITH SOAP AND WATER. CHECK FOR FLUORESCENCE OF RESIDUES WITH UV LIGHT. DISPOSE OF WASTE SOLUTIONS AND MATERIALS BY INCINERATION.

### A. Background

Dibenz[a,h]anthracene (DBA) is well established as a carcinogen, intermediate in activity between benz[a]anthracene and 7,12-dimethylbenz[a]anthracene. DBA is detected as an environmental contaminant at levels generally lower than benzo[a]pyrene or benz[a]anthracene. It has no known commercial or industrial use and is employed solely in carcinogenesis research. It is destroyed through photooxidation in the atmosphere and is believed to be degraded slowly by bacteria in the soil.

issued 11/81

## Chemical and Physical Data

1. Chemical Abstract No.: 53-70-3

2. Synonyms:

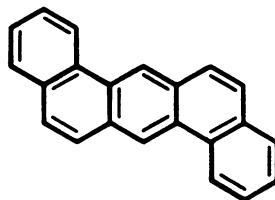
DBA 1,2,5,6-Dibenzanthracene

DB(a,h)A 1,2:5,6-Dibenzanthracene

1,2,5,6-Dibenzanthracene

3. Molecular  
formula:  
 $C_{22}H_{14}$

structure:



weight:  
278.33

4. Density: 1.282 g/cm<sup>3</sup>.

5. Absorption spectroscopy: UV (Friedel and Orchin, 1951; Perkamper et al., 1967); UV fluorescence (Sawicki et al., 1967); IR (Sadtlir, 1961; Pouchert, 1970); NMR (Clin and Lemanceau, 1970; Haigh et al., 1970; Ozubko et al., 1974).

6. Vapor pressure: No data.

7. Solubility: Soluble in most organic solvents; slightly soluble in alcohol; solubility in water, 0.0005 mg/liter at 27°C.

8. Description, appearance: Colorless plates.

9. Boiling point: 524°C.

Melting point: 267°C.

10. Stability: Stable in dark at ambient temperature or below. Solutions undergo photooxidation in air and light.

11. Chemical reactivity: Not spontaneously reactive, but enters into numerous types of reactions with organic reagents.

12. Flash point: Does not apply.

13. Autoignition temperature: No data.

14. Flammable limits: Does not apply.

## Fire, Explosion, and Reactivity Hazard Data

1. DBA does not require special fire-fighting procedures or equipment. Because of the electrostatic nature of dry DBA, fire fighters should wear full-face masks.
2. DBA does not present unusual fire and explosion hazards.
3. DBA is unstable in presence of light and is more unstable when UV radiation is present.
4. Incompatibilities: No data.
5. DBA is not known to produce hazardous decomposition products.
6. DBA is nonvolatile and does not require nonspark equipment. When handled in flammable solvents such as benzene, the precautions required for such solvents will apply. In powdered form DBA is electrostatic, and when used in this form, it requires the use of antistatic devices.

## Operational Procedures

The NIH Guidelines for the Laboratory Use of Chemical Carcinogens describe operational practices to be followed when potentially carcinogenic chemicals are used in NIH laboratories. The Guidelines should be consulted to identify the proper use conditions required and specific controls to be implemented during normal and complex operations or manipulations involving DBA.

1. Chemical inactivation: No validated method reported.
2. Decontamination: Turn off equipment that could be affected by DBA or the materials used for cleanup. If more than 1 g has been spilled or if there is any uncertainty regarding the procedures to be followed for decontamination, call the NIH Fire Department (dial 116) for assistance. Wash surfaces with copious quantities of soap and water. Glassware should be rinsed (in a hood) with an organic solvent (not alcohol), followed by soap and water. Animal cages should be washed with soap and water.
3. Disposal: No waste streams containing DBA shall be disposed of in sinks or general refuse. Surplus DBA or chemical waste streams contaminated with DBA shall be handled as hazardous chemical waste and disposed of in accordance with the NIH chemical waste disposal system. Nonchemical waste (e.g.,

animal carcasses and bedding) containing DBA shall be handled and packaged for incineration in accordance with the NIH medical-pathological waste disposal system. Potentially infectious waste (e.g., tissue cultures) containing DBA shall be disinfected by heat using a standard autoclave treatment and packaged for incineration, as above. Burnable waste (e.g., absorbent bench top liners) minimally contaminated with DBA shall be handled as potentially infectious waste and packaged for incineration, as above. Absorbent materials (e.g., associated with spill cleanup) grossly contaminated shall be handled in accordance with the chemical waste disposal system. Radioactive waste containing DBA shall be handled in accordance with the NIH radioactive waste disposal system.

4. Storage: Store solid DBA and its solutions in dark-colored, tightly closed containers, preferably under refrigeration.

#### Monitoring and Measurement Procedures Including Direct Field Measurements and Sampling for Subsequent Laboratory Analysis (Jones and Freudenthal, 1978)

1. Sampling: Two methods are recommended: using an adsorption sampler in which cooled air is passed through Tenax and using high-volume filtration through fiberglass filter traps.
2. Separation and analysis: Several methods are available and offer various degrees of sensitivity. For separation, TLC, HPLC, and GC are useful. TLC is the least efficient of these three methods. HPLC and GC are highly efficient. The most useful and sensitive method for separation and analysis of DBA is GC-MS. This method allows for accurate identification in the nanogram to picogram level; it is still desirable to confirm the identification by other analytical methods. UV spectroscopy is useful but is limited because of possible similarity in spectra with a related compound. Fluorescence spectroscopy gives both excitation and emission spectra and its sensitivity level is in the nanogram range. It is more sensitive than UV by a factor of  $10^2$  or  $10^3$  or greater. Other methods are phosphorescence, NMR, and IR spectroscopy.

#### Biological Data (Animal and Human)

1. Absorption: There are no data, but in analogy with other polycyclic aromatic hydrocarbons it may be assumed that DBA should be readily absorbed through the skin, by intravenous and intraperitoneal injection, and by inhalation.

2. Distribution: No data, but probably distributed to lipid-containing tissues.
3. Metabolism and excretion: Like other polycyclic aromatic hydrocarbons, DBA is metabolized by the aryl hydrocarbon hydroxylase system of mammalian liver to a variety of epoxides, diols, and phenols, some of which are responsible for the toxic and carcinogenic action of DBA (Kuroki et al., 1972). There are no data on excretion products but they are likely to be conjugates of these metabolites.
4. Toxic effects: There are no data on the acute toxicity of DBA. As a class, polycyclic aromatic hydrocarbons are regarded as having low acute toxicity in animals and man (Boyland et al., 1965; Heidelberger, 1975). There is no specific target organ but rather a general toxic (and carcinogenic) effect on epithelial and fibroblastic cells.
5. Carcinogenic effects: DBA is moderately carcinogenic in experimental animals. Lung and skin carcinomas have been reported in mice after parenteral or topical treatment with DBA, and fibrosarcomas have been produced in rats after subcutaneous injection.
6. Mutagenic and teratogenic effects: DBA is mutagenic in the Ames test and in mammalian cell cultures in the presence of a metabolizing system. There is no evidence for teratogenicity.

### Emergency Treatment

1. Skin and eye exposure: For skin exposure, remove contaminated clothing and wash skin with soap and water. Skin should not be rinsed with organic solvents or scanned with UV light. For eye exposure, irrigate immediately with copious quantities of running water for at least 15 minutes.
2. Ingestion: Drink plenty of water. Induce vomiting.
3. Inhalation: Remove victim promptly to clean air. Administer rescue breathing if necessary.
4. Refer to physician.

### References

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